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TITLE: The impact of temporal geopotential variations on GPS

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ABSTRACT BODY:

Lemoine et al. (2006) and Lemoine et al. (2010) showed that applying more detailed models of time-variable gravity (TVG) improved the quality of the altimeter satellite orbits (e.g. TOPEX/Poseidon, Jason-1, Jason-2). This modeling include application of atmospheric gravity derived from 6-hrly pressure fields obtained from the ECMWF and annual gravity variations to degree & order 20x20 in spherical harmonics derived from GRACE data. This approach allowed the development of a consistent geophysical model for application to altimeter satellite orbit determination from 1993 to 2011. In addition, we have also evaluated the impact of TVG modeling on the POD of Jason-1 and Jason-2 by application of a weekly degree & order four gravity coefficient time series developed using data from ten SLR & DORIS-tracked satellites from 1993 to 2011 (Lemoine et al., 2011).

In this study we first evaluate the impact of a more detailed TVG modeling to the GPS constellation orbits and positions of a dedicated IGB08 GPS core station network used for the Jason-1 and Jason-2 POD. Using the NASA GSFC GEODYN orbit determination software, for the computation of the GPS constellation orbits we use a consistent LEO-to-ground GPS station approach with Jason-1 and Jason-2. Then subsequently we re-estimate the GPS ground station orbits.

INDEX TERMS: [1229] GEODESY AND GRAVITY / Reference systems, [1217] GEODESY AND GRAVITY / Time variable gravity, [1225] GEODESY AND GRAVITY / Global change from geodesy, [1240] GEODESY AND GRAVITY / Satellite geodesy: results.